

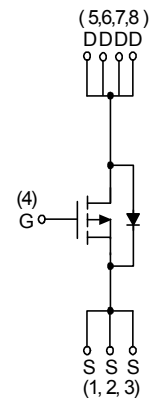
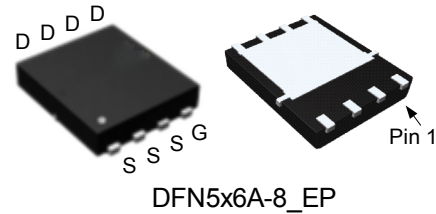
### Features

- -40V/-70A,  
 $R_{DS(ON)} = 6\text{ m}\Omega$  (typ.) @  $V_{GS} = -10\text{V}$   
 $R_{DS(ON)} = 8\text{ m}\Omega$  (typ.) @  $V_{GS} = -4.5\text{V}$
- 100% UIS +  $R_g$  Tested
- Reliable and Rugged
- Lead Free and Green Devices Available (RoHS Compliant)

### Applications

- Power Management in LCD TV Inverter.

### Pin Description



P-Channel MOSFET

## Absolute Maximum Ratings ( $T_A = 25^\circ\text{C}$ Unless Otherwise Noted)

| Symbol            | Parameter                                           |                           | Rating     | Unit               |
|-------------------|-----------------------------------------------------|---------------------------|------------|--------------------|
| $V_{DSS}$         | Drain-Source Voltage                                |                           | -40        | V                  |
| $V_{GSS}$         | Gate-Source Voltage                                 |                           | $\pm 20$   |                    |
| $I_D^c$           | Continuous Drain Current ( $V_{GS} = -10\text{V}$ ) | $T_C = 25^\circ\text{C}$  | -70        | A                  |
|                   |                                                     | $T_C = 100^\circ\text{C}$ | -53        |                    |
| $I_{DP}^c$        | 300 $\mu\text{s}$ Pulsed Drain Current Tested       | $T_C = 25^\circ\text{C}$  | -210       |                    |
| $I_S^c$           | Diode Continuous Forward Current                    |                           | -70        |                    |
| $I_{AS}^b$        | Avalanche Current, Single pulse                     | $L = 0.5\text{mH}$        | -41        | mJ                 |
| $E_{AS}^b$        | Avalanche Energy, Single pulse                      | $L = 0.5\text{mH}$        | 420        |                    |
| $T_J$             | Maximum Junction Temperature                        |                           | 150        | $^\circ\text{C}$   |
| $T_{STG}$         | Storage Temperature Range                           |                           | -55 to 150 |                    |
| $P_D^c$           | Maximum Power Dissipation                           | $T_C = 25^\circ\text{C}$  | 52         | W                  |
|                   |                                                     | $T_C = 100^\circ\text{C}$ | 20         |                    |
| $R_{\theta JA}^a$ | Thermal Resistance-Junction to Ambient              | $t \leq 10\text{s}$       | 25         | $^\circ\text{C/W}$ |
|                   |                                                     | Steady State              | 60         |                    |
| $R_{\theta JC}^c$ | Thermal Resistance-Junction to Case                 | Steady State              | 2.4        |                    |

Note a : Surface Mounted on 1in<sup>2</sup> pad area,  $t \leq 10\text{sec}$ .  $R_{\theta JA}$  steady state  $t = 999\text{s}$ .

Note b : UIS tested and pulse width limited by maximum junction temperature  $150^\circ\text{C}$  (initial temperature  $T_J = 25^\circ\text{C}$ ).

Note c : The power dissipation  $P_D$  is based on  $T_{J(MAX)} = 150^\circ\text{C}$ , and it is useful for reducing junction-to-case thermal resistance ( $R_{\theta JC}$ ) when additional heat sink is used.

## Electrical Characteristics (T<sub>A</sub> = 25°C unless otherwise noted)

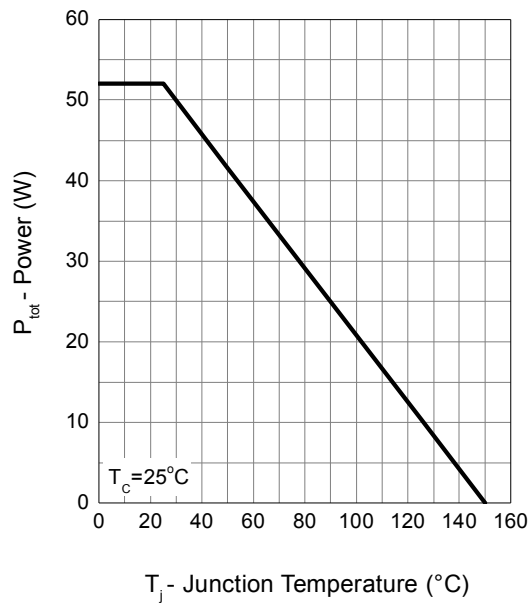
| Symbol                                   | Parameter                        | Test Conditions                                                                                                                               | Min.        | Typ.         | Max.              | Unit |
|------------------------------------------|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|-------------|--------------|-------------------|------|
| Static Characteristics                   |                                  |                                                                                                                                               |             |              |                   |      |
| BV <sub>DSS</sub>                        | Drain-Source Breakdown Voltage   | V <sub>GS</sub> =0V, I <sub>DS</sub> =-250μA                                                                                                  | -40         | -            | -                 | V    |
| I <sub>DSS</sub>                         | Zero Gate Voltage Drain Current  | V <sub>DS</sub> =-32V, V <sub>GS</sub> =0V<br>T <sub>J</sub> =85°C                                                                            | -           | -            | -1<br>-30         | μA   |
| V <sub>GS(th)</sub>                      | Gate Threshold Voltage           | V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =-250μA                                                                                    | -1.5        | -2           | -2.5              | V    |
| I <sub>GSS</sub>                         | Gate Leakage Current             | V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V                                                                                                    | -           | -            | ±100              | nA   |
| R <sub>DS(ON)</sub> <sup>d</sup>         | Drain-Source On-state Resistance | V <sub>GS</sub> =-20V, I <sub>DS</sub> =-25A<br>V <sub>GS</sub> =-10V, I <sub>DS</sub> =-25A<br>V <sub>GS</sub> =-4.5V, I <sub>DS</sub> =-15A | -<br>-<br>- | 6<br>8<br>11 | 7.5<br>10.5<br>15 | mΩ   |
| Diode Characteristics                    |                                  |                                                                                                                                               |             |              |                   |      |
| V <sub>SD</sub> <sup>d</sup>             | Diode Forward Voltage            | I <sub>SD</sub> =-1A, V <sub>GS</sub> =0V                                                                                                     | -           | -0.75        | -1                | V    |
| t <sub>rr</sub>                          | Reverse Recovery Time            | I <sub>SD</sub> =-25A, dI <sub>SD</sub> /dt=100A/μs                                                                                           | -           | 23           | -                 | ns   |
| Q <sub>rr</sub>                          | Reverse Recovery Charge          |                                                                                                                                               | -           | 10           | -                 | nC   |
| Dynamic Characteristics <sup>e</sup>     |                                  |                                                                                                                                               |             |              |                   |      |
| R <sub>G</sub>                           | Gate Resistance                  | V <sub>GS</sub> =0V, V <sub>DS</sub> =0V, F=1MHz                                                                                              | -           | 3.8          | 7.6               | Ω    |
| C <sub>iss</sub>                         | Input Capacitance                | V <sub>GS</sub> =0V,<br>V <sub>DS</sub> =-20V,<br>Frequency=1.0MHz                                                                            | -           | 4780         | 3614              | pF   |
| C <sub>oss</sub>                         | Output Capacitance               |                                                                                                                                               | -           | 626          | -                 |      |
| C <sub>rss</sub>                         | Reverse Transfer Capacitance     |                                                                                                                                               | -           | 531          | -                 |      |
| t <sub>d(ON)</sub>                       | Turn-on Delay Time               | V <sub>DD</sub> =-20V, R <sub>L</sub> =20Ω,<br>I <sub>DS</sub> =-1A, V <sub>GEN</sub> =-10V,<br>R <sub>G</sub> =6Ω                            | -           | 17           | 31                | ns   |
| t <sub>r</sub>                           | Turn-on Rise Time                |                                                                                                                                               | -           | 14           | 25                |      |
| t <sub>d(OFF)</sub>                      | Turn-off Delay Time              |                                                                                                                                               | -           | 59           | 106               |      |
| t <sub>f</sub>                           | Turn-off Fall Time               |                                                                                                                                               | -           | 22           | 40                |      |
| Gate Charge Characteristics <sup>e</sup> |                                  |                                                                                                                                               |             |              |                   |      |
| Q <sub>g</sub>                           | Total Gate Charge                | V <sub>DS</sub> =-20V, V <sub>GS</sub> =-10V,<br>I <sub>DS</sub> =-25A                                                                        | -           | 59           | 83                | nC   |
| Q <sub>gs</sub>                          | Gate-Source Charge               |                                                                                                                                               | -           | 8            | -                 |      |
| Q <sub>gd</sub>                          | Gate-Drain Charge                |                                                                                                                                               | -           | 16           | -                 |      |

Note d : Pulse test; pulse width≤300μs, duty cycle≤2%.

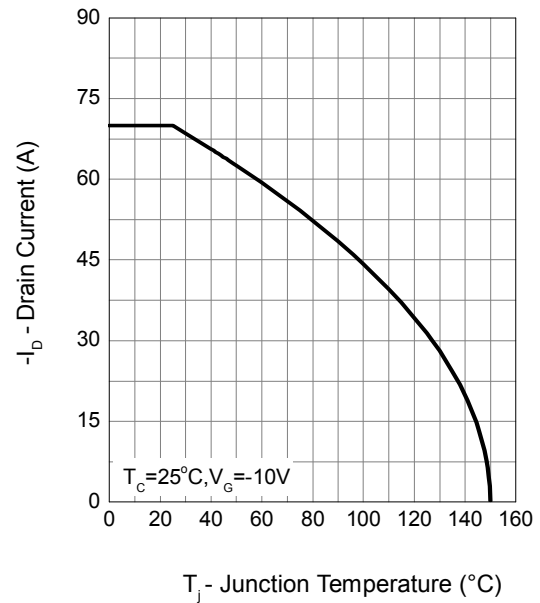
Note e : Guaranteed by design, not subject to production testing.

### Typical Operating Characteristics

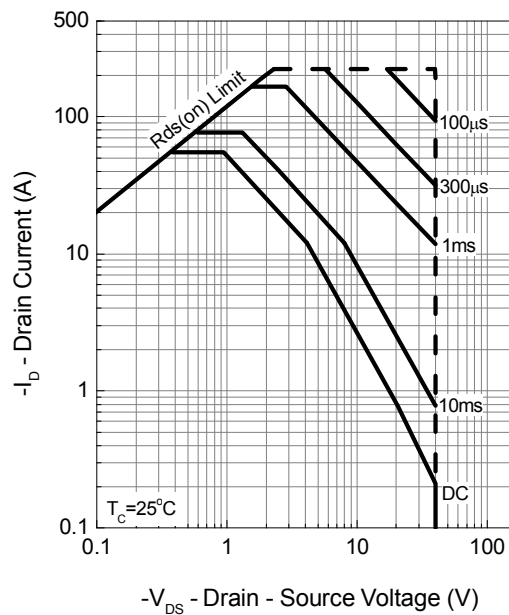
**Power Dissipation**



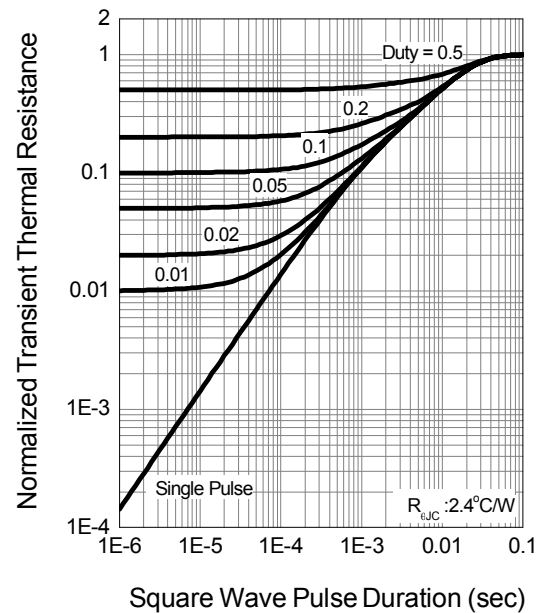
**Drain Current**



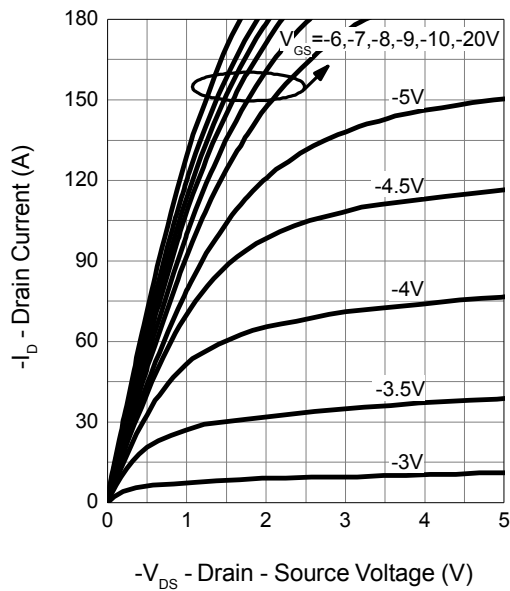
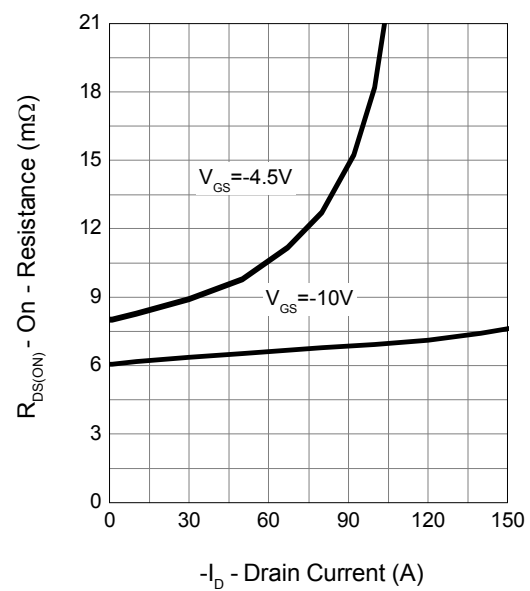
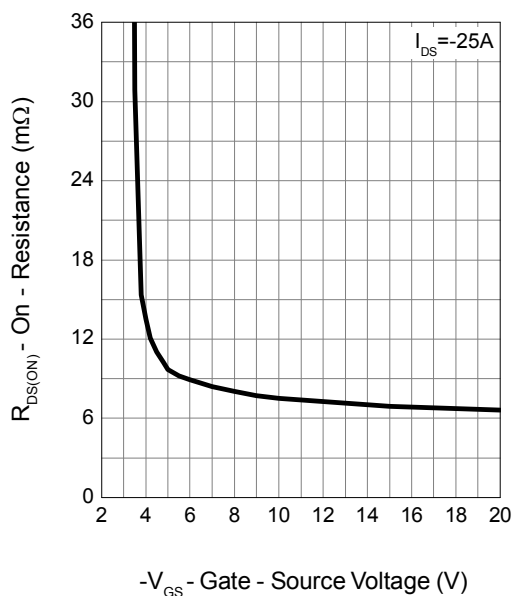
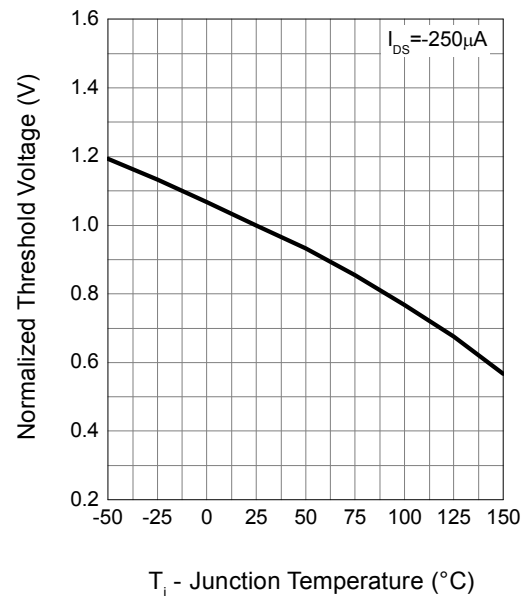
**Safe Operation Area**



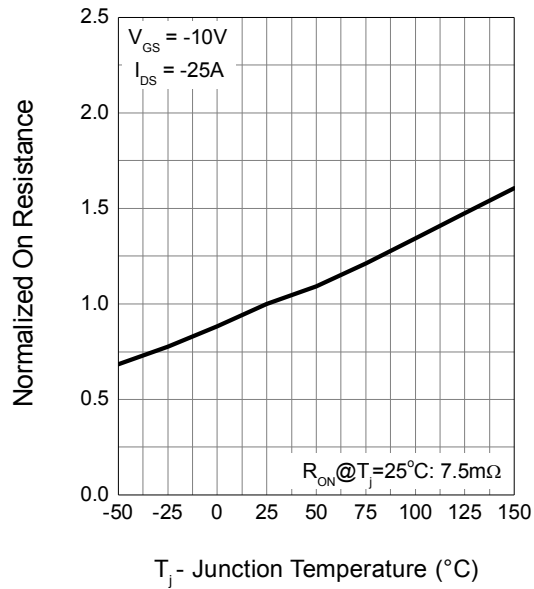
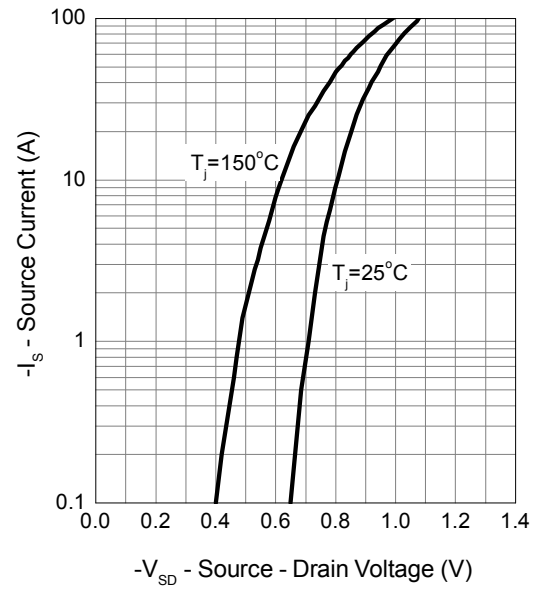
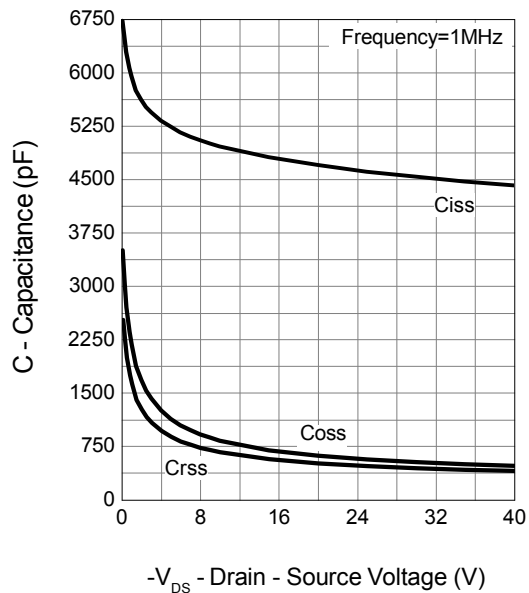
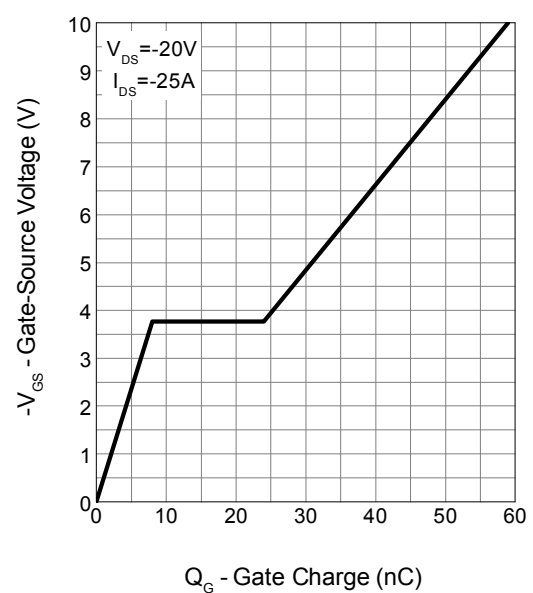
**Thermal Transient Impedance**



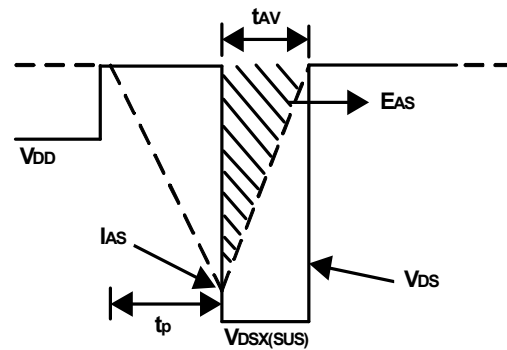
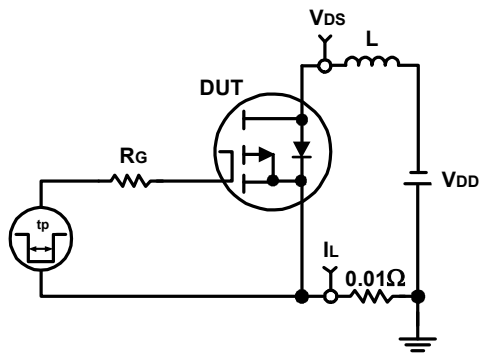
## Typical Operating Characteristics (Cont.)

**Output Characteristics**

**Drain-Source On Resistance**

**Gate-Source On Resistance**

**Gate Threshold Voltage**


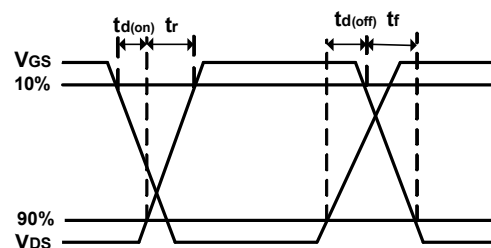
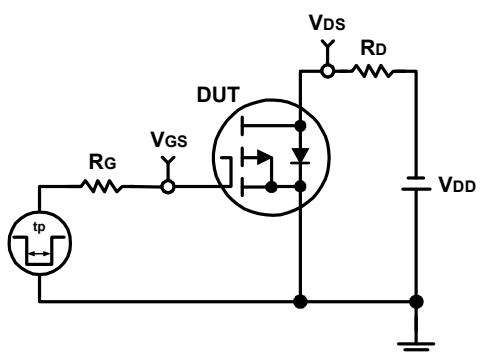
## Typical Operating Characteristics (Cont.)

**Drain-Source On Resistance**

**Source-Drain Diode Forward**

**Capacitance**

**Gate Charge**


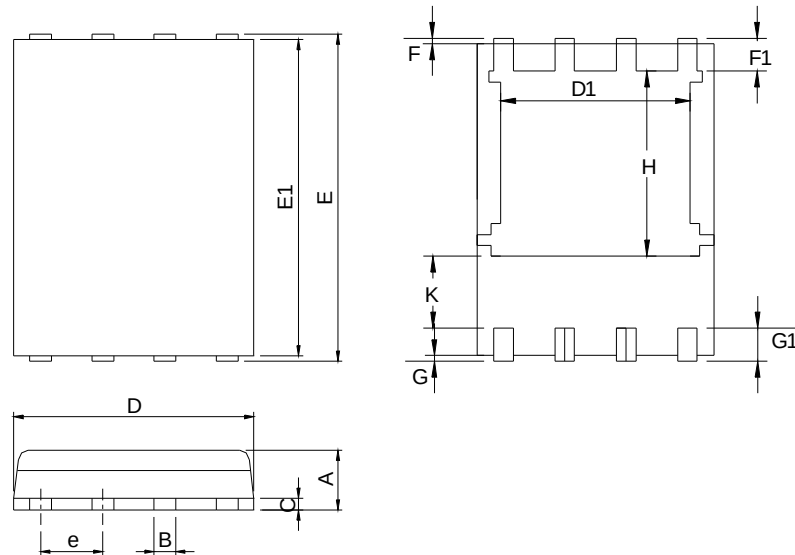
## Avalanche Test Circuit and Waveforms



## Switching Time Test Circuit and Waveforms



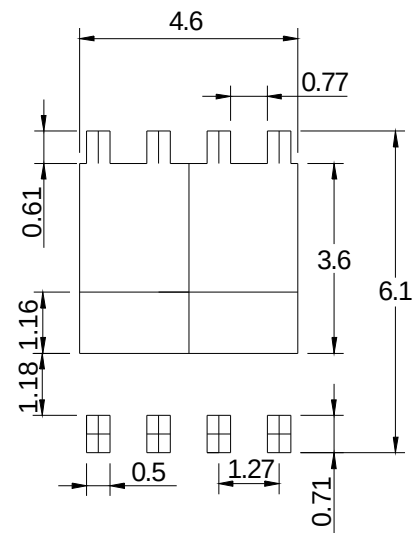
## Package Information

**DFN5x6-8**


| SYMBOL | DFN5x6-8    |      |           |       |
|--------|-------------|------|-----------|-------|
|        | MILLIMETERS |      | INCHES    |       |
|        | MIN.        | MAX. | MIN.      | MAX.  |
| A      | 0.90        | 1.20 | 0.035     | 0.047 |
| B      | 0.3         | 0.51 | 0.012     | 0.020 |
| C      | 0.19        | 0.25 | 0.007     | 0.010 |
| D      | 4.80        | 5.30 | 0.189     | 0.209 |
| D1     | 4.00        | 4.40 | 0.157     | 0.173 |
| E      | 5.90        | 6.20 | 0.232     | 0.244 |
| E1     | 5.50        | 5.80 | 0.217     | 0.228 |
| e      | 1.27 BSC    |      | 0.050 BSC |       |
| F      | 0.05        | 0.30 | 0.002     | 0.012 |
| F1     | 0.35        | 0.75 | 0.014     | 0.030 |
| G      | 0.05        | 0.30 | 0.002     | 0.012 |
| G1     | 0.35        | 0.75 | 0.014     | 0.030 |
| H      | 3.34        | 3.9  | 0.131     | 0.154 |
| K      | 0.762       | -    | 0.03      | -     |

Note : 1.Dimension D, D1,D2 and E1 do not include mold flash or protrusions.  
Mold flash or protrusions shall not exceed 10 mil.

### RECOMMENDED LAND PATTERN



UNIT: mm